

# **Flight Planning Branch Space Shuttle Lessons Learned**

Planning products and procedures that allow the mission flight control teams and the astronaut crews to plan, train and fly every Space Shuttle mission have been developed by the Flight Planning Branch at the NASA Johnson Space Center. As the Space Shuttle Program ends, lessons learned have been collected from each phase of the successful execution of these Shuttle missions. Specific examples of how roles and responsibilities of console positions that develop the crew and vehicle attitude timelines will be discussed, as well as techniques and methods used to solve complex spacecraft and instrument orientation problems. Additionally, the relationships and procedural hurdles experienced through international collaboration have molded operations. These facets will be explored and related to current and future operations with the International Space Station and future vehicles. Along with these important aspects, the evolution of technology and continual improvement of data transfer tools between the shuttle and ground team has also defined specific lessons used in the improving the control teams effectiveness. Methodologies to communicate and transmit messages, images, and files from Mission Control to the Orbiter evolved over several years. These lessons have been vital in shaping the effectiveness of safe and successful mission planning that have been applied to current mission planning work in addition to being incorporated into future space flight planning. The critical lessons from all aspects of previous plan, train, and fly phases of shuttle flight missions are not only documented in this paper, but are also discussed as how they pertain to changes in process and consideration for future space flight planning.